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AN
INAUGURAL ESSAY
ON
THE ABSORPTION OF BILE,
Submitted to the consideration
OF
THE HONOURABLE ROBERT SMITH, PROVOST,
AND OF THE
REGENTS OF THE UNIVERSITY OF MARYLAND,

BY

ROBERT W. ERVIN

Of South Carolina Charleston District

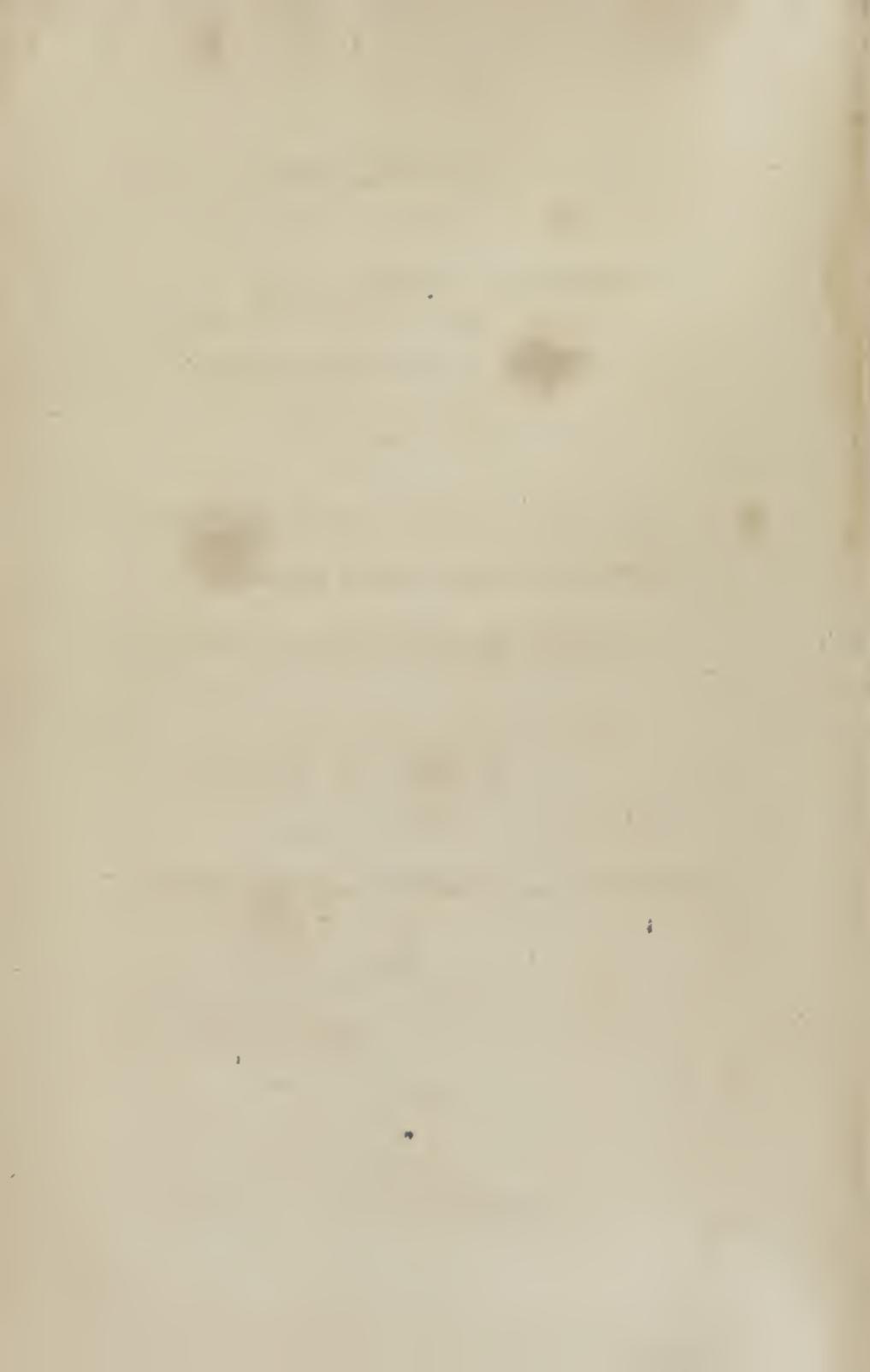
MEMBER OF THE BALTIMORE MEDICAL SOCIETY.

Misery, at the Portal of Humanity, asks, relief through the Medium of Science.

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.....
May, 1813.



TO

NATHANIEL POTTER, M. D.

Professor of the Practice of Physick in the University of Maryland,

THIS PRODUCTION

Of

YOUTHFUL THOUGHTS ON MEDICINE

IS DEDICATED

Not as a memorial of its worth,

BUT AS

A TRIBUTE OF RESPECT AND ESTEEM

FROM

THE AUTHOR.

AN ESSAY.

WITH a view to elucidate the phenomena of the absorption of bile, it may be necessary to explain the relations of the liver to the body, and its functions as a secretory and an excretory organ. The liver, a large viscus occupying a great part of the abdomen, is held in its situation by ligamentous attachments to the diaphragm and abdominal muscles; lying in contact with the bowels and stomach, is consequently much influenced by the varied actions and dispositions of those viscera, to which it is so intimately connected. The liver is supplied with an artery, of no great size, when compared to the bulk of the viscus, to which its blood gives nourishment and vitality. It is furnished with a vein of considerable magnitude, formed by most of the veins of the abdominal viscera, which soon unite into one trunk, and enter the liver by two or three smaller trunks, which ramify into very minute branches, and terminate in capillary vessels in the substance of the liver, to form the *pori biliarii*, in which the bile is secreted from the blood of the *vena portae*. The ducts of the liver are destined to carry off the bile, when secreted, into the duodenum. The *vessicula fellsis*, or gall bladder, is a receptacle for the bile; where it acquires a greater viscosity and deeper colour by the absorption of the thinner parts of that fluid. Some have said that a peculiar viscid secretion of the gall bladder sheathed it from the acri-
mony of the fluid in that receptacle and increased the

tenacious consistence of the bile. The liver is furnished with hepatic veins that return the blood into the *vena cava*; also with nerves, and is abundantly supplied with absorbent vessels.

It was supposed formerly that the ducts of the liver had a power in themselves sufficient for the expulsion of the bile contained in them, but experiments show no appearance of muscularity in the ducts, as they do not contract on the application of *stimuli*.

Different opinions have been entertained by authors concerning the formation and absorption of bile. Boerhaave and Morgagni supposed jaundice to be owing to a suspended secretion of bile, hence they concluded that bile as well as all other secretions pre-existed in the mass of blood, and that the business of the glands was only to separate mechanically, as strainers, the different fluids from the blood; and that, when from any cause this separation did not take place in the glands, the blood was contaminated, and the floating secretions became the cause of obstructions and disease in some part of the body, or of disorder in the whole system. Physiologists of the present day, have nearly extinguished that hypothesis by the light of one more rational: they consider the blood as a general pabulum, and that the glands modify or change the fluid agreeably to their several modes of action, so that each secreted fluid is different from every other; the secretions appear as entirely new productions from the same original fluid: this last conclusion seems most satisfactory; for did the secreted fluids all pre-exist in the mass of blood, they would as often be arrested by one gland as another; and any gland might occasionally separate bile from the blood as easily as its peculiar secretion. These

precarious offices of the glands being no longer admitted, we conclude that every set of glands secretes a fluid *sui generis*, that the liver alone is destined to the secretion of bile, and that when bile appears in other parts, as on the surface of the body, the absorption of it must be brought into consideration.

On this point the ancients and moderns differ. Baron Haller who introduced absorption by the veins, called regurgitation, was led to this opinion from observing fluid injections pass from the hepatic veins into the ducts, which is incontrovertible. Experiments also show, that on tying the hepatic ducts, the absorbents of the liver were found loaded with bile. Experiments have, however, not been quite sufficient to explode entirely the long established doctrine of Haller. At the present time, greater accuracy is attained, in the investigation of the absorbent system, and its functions are more extensively understood.— The office of the lymphatics and laeteals, is no longer doubted to be, that of conveying fluids from different parts of the body into the circulation. It is very probable, that in all cases of obstruction to the passage of bile into the duodenum, that it is alone absorbed by the lymphatics of the liver, independently of regurgitation, and absorption by the hepatic veins. Agreeably to analogical reasoning it cannot be presumed that two systems, so dissimilar as the veins and absorbents should be engaged in the same business at the same time, or that the one should occasionally perform the functions of the other. Absorption of bile, in particular cases, has been so instantaneous, that some physiologists have been induced to suppose the bile could not have been carried with such celerity, into the circulation through the medium of absorbents.—

But when we reflect on the capacity of these instruments of conveyance, to take on increased action in performing their functions ; we may conclude that the same stimulus which hurried the action of the system, and especially, that of the liver, was at the same time applied to the absorbents, and that by a peculiar law in the animal economy, correspondent actions were induced in them : hence the absorption of bile is rapidly increased, and its passage into the duodenum proportionately accelerated. This opinion is supported by some accounts of violent cases of *diuresis*, in which the urine was discharged so copiously, as to suggest an idea of the aqueous fluids passing more directly to the bladder, than through the ordinary route by the kidneys and ureters, into the urinary bladder. The most plausible mode of accounting for such phenomena, appears to be that just mentioned—increased action of the absorbent system, from the application of stimuli, or from sympathy with other parts affected. This is also evidenced in many similar instances, as the rapid and often unexpected disappearance of cutaneous eruptions, watery effusions, buboes and ulcers, by absorption. These phenomena usually take place after depletions, by blood-letting, emetics, catharticks or any other evacuation, in which cases the system is left excitable, and susceptible of all the common impressions to which it may be exposed ; by which the absorbents are put into action, and in such cases remove deceased secretions, or depositions from various parts of the body, by which the system soon recovers from exhaustion. These operations cannot well be expected unless the system is in every respect capable of resuming its ordinary functions of nutrition. Cases have been related in which dropsies, probably from similar operations as those

mentioned above, have suddenly disappeared. A case in point is related of the unexpected application of cold water to a dropsical sailor, by his tumbling overboard, in which there was the combined action of cold, and the fear of drowning; in a short time after this occurrence a reaction was established in the system, and immediately a profuse discharge of urine took place, during the continuance of which the dropsy disappeared. All these phenomena assist in establishing the opinion of the increased action of absorbents from the application of *stimuli*, and tendency in the animal economy to restore healthy action in the system.

From the sudden appearance of bile upon the surface of the body, it has been suggested that the capillary vessels might have secreted it as the extremities of arteries are said to secrete pus from a peculiar irritation of their points; but this opinion does not seem applicable to the bile, as the liver is sufficiently known to be adapted particularly to the secretion of that fluid; and no gland is known to secrete pus, unless the deceased solids take on the function of a gland as is supposed to happen in ulcers &c. The sudden and rapid absorption of bile seldom occurs, except, when there is an increased secretion of it in the liver, from febrile causes acting upon the nerves of the liver, or from mechanical violence done to it as by wounds &c. In cases of some bilious fever, or cholera morbus, there generally is a profuse discharge of bilious matter both from the stomach and bowels, which is an evidence of the free passage of bile through the ducts into the duodenum, consequently there can be no obstruction in the ducts; yet an absorption of bile takes place frequently in a very short time:—this must be attributed to the activity of the absorbents, induced not

only by the stimulus that caused the disease, but also by the quantity and quality of the bile secreted, which occasions an absorption of it, not from the liver alone but from the bowels, and perhaps the stomach, by which the bile is taken up in large quantities before it can escape out of the system, and is carried in a short time into the circulation, and appears on the surface of the body. In cases of increased secretion of bile, a constipation of the bowels occasions a greater absorption of bile from its retention in the intestines, and generally in such cases vomiting becomes more profuse and obstinate, from the bile passing in greater quantities into the stomach, and stimulates it, thereby exciting violent action in the surrounding muscles. The most common causes of absorption of bile, are obstructions in the duct, impeding or entirely preventing, the passage of bile into the *duodenum*: these obstructions may be the effect of many causes, such as biliary concretions, pressure by surrounding parts, as a deceased pancreas, gravid uterus, tumours, indurations, adhesions of the internal surface of the ducts, or stricture, or spasm in the intestine, where the *ductus communis choliodochus* enters the *duodenum*. The disease induced by such, or similar causes, has been termed Jaundice. Dr. Cullen has distinguished five species of this disease, viz. *Ieterus*, *Calculosus*, *Spasmodicus*, *Hypaticus*, *Gravidarium* and *Infantum*, all these terms are derived from the supposed seat of the obstructing body, or from the state of the person deceased. It is probable that obstructions in the ducts of the liver are most frequently induced by calculi, or biliary concretions, which obstructions may be of long or short duration. The period of their continuance is generally determined by the particular condition of the concre-

tions and the duets; also, by circumstances promoting or retarding their expulsion from the common duets, in every case of obstruction of the outlet of the bile when secreted, the fluid in the liver being accumulated, must escape by some channel, and this is supposed to be through the medium of the lymphaticks of the liver; by which the bile is conveyed into the circulation, and discovers itself generally first in the tunica conjunctiva of the eye—it becomes visible in that part first, probably from the contrast between white and yellow; after some time the whole surface partakes of that yellow cast. In some cases of obstinate confirmed Jaundice from permanently fixed causes of obstruction, dissections have demonstrated the presence of bile in every part of the body; even the bones were found tinged of a yellow colour; hence it appears, that the arteries deposit bile in every part of the body when it has been taken into the circulation.

One of the most common remote causes of Jaundice is *miasmata* acting upon the liver, inducing at first increased secretion of bile, and, in some instances, by bringing on *hepatitis*, the liver is left in a state predisposed by a chronick inflammation, to secrete more bile than is ordinary, by which inflammation the duets may become so diseased that adhesion of their coats will take place; or from the weakness induced by previous *stimulus* applied to the liver a spasm is brought on in the intestine where the common duct enters. In cases of partial obstruction concretions may readily be formed in the gall bladder or in the duets by the gradual absorption of the thinner parts of the bile, leaving the residue in a concentrated state, fit for the formation of *calculi*, which are often the cause of long continued obstruction to the excretion of bile.

and jaundice is the result. Obstructions from the pressure of adjacent tumours or diseased and enlarged pancreas are of the most obstinate kind, except a closure of the ducts themselves, which may be induced by pressure long continued, independently of any other agent. Jaundice from the causes last mentioned, cannot be remedied, except it were possible to remove the obstruction, and thus to allow the ducts to resume their natural capacities.— From the peculiar structure of the biliary ducts, it appears they can have little or nothing to do in the excretion of bile—therefore the excretion of bile must depend very much upon the parts about the liver. The stomach, when distended, acts upon it by pressure; consequently the flow of bile into the duodenum is greatest after a full meal, or when the stomach is distended, which promotes chylification. The abdominal muscles also assist in the expulsion of bile from the liver, by their pressure upon the surrounding viscera. From the consideration of all these circumstances, it is not difficult to perceive what dependence there is of the liver for the discharge of its excretion, on the parts with which it is connected. The motion of the body also comes in as an agent to favour the excretion of bile. Hence persons engaged in sedentary occupations, or indulging in indolence and inactivity are subject to Jaundice. Women in a state of gestation are liable to this disease, from the pressure of the uterus obstructing the flow of the bile, and from a disposition to indulge in inactivity at that period. Spasm or stricture in the duodenum might readily induce obstruction, from the peculiar oblique manner in which the *ductus communis* enters the intestine. When obstructions to the discharge of bile happen from spasm or stricture,

they are generally only temporary, as is shown by the short duration of some cases of Jaundice.

Any obstruction to the free admission of bile into the duodenum may be the cause of absorption of that fluid, thereby all the symptoms of a Jaundice are induced: which are, first, a yellowish tint in the *tunica conjunctiva* of the eye, which appearance gradually pervades the whole surface of the body. In the course of this disease several symptoms occur, such as "a sense of lassitude and languor, pain and tension, or oppression about the *præcordia*; frequently much anxiety and some difficulty in breathing, the skin is sometimes attended with itching; often accompanied with nausea and vomiting, flatulency, acidity, and indigestion; and the *faeces*, which are commonly of a whitish colour, have not their usual *faeculent* smell. In the most unsavourable state of the disease hiccups and occasional paroxysms of rigors and chills" come on.

All the symptoms enumerated above do not invariably occur in Jaundice; but some of them are inseparable from the disease. From the phenomena observed in Jaundice, it is probable that, in some cases, a small degree of inflammation takes place from the irritation of the accumulated bile in the ducts, inducing distension of the substance of the liver, and the consequent pain and oppression felt about the *præcordia* and adjacent parts, which is imparted to the stomach by a sympathetic action, or from pressure upon the *pylorus* by which nausea is induced and the stomach is caused to throw off its contents by the combined action of the diaphragm and abdominal muscles. The difficulty in respiration is, probably, brought on by similar causes, and is attributable to the intimate connection between the liver and diaphragm. And from the immediate

dependance of complete digestion and chylification on the properties of bile, its absence in the duodenum would be a cause alone sufficient to produce all the phenomena mentioned above, appertaining to the stomach and bowels, such as indigestion, flatulency, nausea and vomiting; the want of colour in the excretions from the bowels, evinces the absence of bile; and a consequent torpor and inactivity in the bowels show the want of that necessary stimulus afforded by the bile in the intestines, which torpor, in long continued cases of jaundice, extends through the whole system, producing languor and lassitude. In almost every case of Jaundice a constipation of the bowels attends; this arises from the want of bile in the intestines, which state of costiveness increases the disposition to vomiting and headache. This disease is seldom attended with much fever; the pulse in the first stage of it is generally quick, frequent and tense, but rarely ever full and bounding, as in synoeca.

The worst state of this disease, is attended with hiccups, rigors, and chilliness. It is probable that these phenomena proceed from an abscess formed in some part of the substance of the liver in consequence of inflammation in that organ; or, from the great irritation of the obstructing cause, acting sympathetically on the nerves of the diaphragm and abdominal muscles, and thereby inducing singultus, tremors, &c. The symptoms last mentioned seldom occur in Jaundice, and when they do the disease generally terminates fatally. In some cases of immovable obstruction to the passage of bile, the tone of the alimentary canal is so far enervated that the system, for the want of nutrition, gradually sinks, with emaciation and

hectic fever, attended by most of the symptoms enumerated.

From the phenomena of Jaundice, a method of cure may be deduced. The removing of the obstructing cause is first to be attempted. There is, perhaps, no method better adapted to this view than vomiting, as in that process the diaphragm and abdominal muscles are thrown into great action, whereby the liver is violently compressed, which effect favours the removal of the body obstructing the ducts of the liver.

Emetics have been given in Jaundice for the purpose of removing obstructions from the ducts; but from the uncertainty of vomiting removing the obstruction, and, when that effect was not produced, it having been found that, violent vomiting, instead of alleviating the symptoms only served to aggravate the disease: nauseating doses of emetics are now considered more safe and effectual in removing biliary concretions; the nausea should in most instances, the better to ensure success, be continued for some time, and eventually full vomiting should be produced. By this practice the action takes place gradually, and the parts concerned have time to accommodate their capacities to the bulk of the obstructing material, without incurring the danger of inducing inflammation in the ducts. In almost every case of Jaundice small, but repeated, doses of some mild cathartic medicine will be found beneficial: small doses of calomel with rhubarb combined will, perhaps, answer best; by which, gentle evacuations may be produced, while tone is imparted to the intestines. Gentle motion of the body should, in every case, be advised, as, by sailing at sea, riding in a carriage or on horse; the latter of which is most efficacious when it can

be practised: these means should be persevered in a considerable time, especially when the disease proves obstinate.

Moderate and constant exercise answers the double purpose of giving motion to the liver and imparting tone and activity to the whole system. Most of the forms of bitters are used with advantage in confirmed Jaundice, as a kind of substitute for the bitter and stimulating properties of bile. In some recent cases of this disease, attended with much pain and urgent symptoms, as difficult respiration with frequent and tense pulse, the loss of a little blood will generally prove advantageous. To this plan of treatment, in the cure of Jaundice, should be added a generous and nutritious diet, of aliment easily digested, selected as the patient may direct. The removal of the obstruction is always followed by an abatement of all the symptoms that were present, and a return of the excretions to their natural appearance, with which the yellowness of the skin gradually disappears. In some obstinate and fixed cases of Jaundice, where the subjects of it live in places constantly or frequently exposed to the action of marsh miasmata, inducing bilious and intermittent fever, the colouring principle of bile gets so permanently blended with the *rete mucosum*, that the absorbents are never sufficient to remove the yellow tint effectually from the skin; such an appearance is not certainly indicative of permanent obstruction, inducing that absorption of bile which causes disease. This position is supported by the appearance of persons in temperate climates, who, in summer and autumn, live under the influence of a warm sun, in marshy tracts of country. *Miasmata* dispose to

the production of bile, by which their cuticular covering assumes a bilious cast. A tawny complexion is as common to the European inhabiting tropical regions, as the black colour is to the natives of Africa. These phenomena in colours, most probably, can be accounted for by considering the combined influence of heat and light, on the reflecting surface of the body, destroying the transparency of the *rete mucosum*.

In concluding this Essay, I feel myself impressed with sentiments of respect and the greatest esteem for the superior excellence of the Professors in the University of Maryland; hoping for their prosperity as citizens, encouraging and improving a science whose usefulness can only be estimated by considering its universal benefits offered to mankind.

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